IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellants:	Anil D. Jha, et al
Serial No.:	10/712,621
Confirmation No:	2148
Filed:	November 13, 2003
For:	WATER TREATMENT SYSTEM AND METHOD
Examiner:	Joseph W. Drodge
Art Unit:	1797

CERTIFICATE OF TRANSMISSION UNDER 37 C.F.R. §1.8(a)

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APPELLANTS' REPLY BRIEF PURSUANT TO 37 C.F.R. § 41.41

This Reply Brief is submitted in response to the Examiner's Answer mailed December 20, 2007 in the above-referenced patent application.

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I. Reply Brief Identification

Appellants:	Anil D. Jha, et al
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II. Status of Claims (37 C.F.R. § 41.37(c)(1)(iii))

Claims 1-70 were originally filed in this application.

Claims 1-20, 30-39, 46-50, 52, and 55-61 were previously canceled without prejudice or disclaimer.

Claims 21-29, 40-45, 51, 53-54, and 62-70 are pending in this application, of which claims 21, 40, 51, 62, 68, and 70 are independent claims.

Each of pending claims 21-29, 40-45, 51, 53, 54, and 62-70 was rejected in a final Office Action dated January 11, 2007.

Appellants appeal the rejection of claims 21-29, 40-45, 51, 53-54, and 62-70. A copy of the appealed claims as pending is attached as a Claims Appendix.

The status of the claims is as follows:

A. Claims 21-26, 40-41, and 44-45 are rejected under 35 U.S.C. § 102(e) as being anticipated by Willman et al. in U.S. Patent Application Publication No. US2004/0118780 (hereinafter "Willman");

B. Claims 51-54, 62, 65, and 68-70 are rejected under 35 U.S.C. § 102(b) as being anticipated by Hirayama et al. in U.S. Patent No. 6,461,512 (hereinafter "Hirayama");

C. Claims 62, 65-67, and 70 are rejected under 35 U.S.C. § 102(e) as being anticipated by Willman;

D. Claim 26 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Willman in view of Rela in U.S. Patent No. 6,607,688 (hereinafter "Rela");

E. Claims 27 and 42 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Willman in view of Sato et al. in U.S. Patent No. 6,733,646 (hereinafter "Sato");

F. Claim 28 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Willman in view of Hirayama;

G. Claims 29 and 43 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Willman in view of the teaching in U.S. Patent No. 6,398,965 to Arba et al. (hereinafter "Arba"); and

H. Claims 63 and 64 are rejected under 35 U.S.C. § 103 (a) as being unpatentable over Hirayama in view of Sato.

A copy of the claims as pending, showing the status of each of the claims is attached as an Appendix of Claims beginning on page 26 of this Reply Brief. The Appendix of Claims is identical to that which accompanied Appellants' Appeal Brief. No new amendments to the claims are presented in this paper.

III. Grounds of Rejection to Be Reviewed on Appeal (37 C.F.R. § 41.37(c)(1)(vi))

The following grounds of rejection are being appealed:

A. Whether claims 21-26, 40-41, and 44-45 are anticipated under 35 U.S.C. § 102(e) by Willman.

B. Whether claims 51-54, 62, 65, and 68-70 are anticipated under 35 U.S.C. § 102(b) by Hirayama.

C. Whether claims 62, 65-67, and 70 are anticipated under 35 U.S.C. § 102(e) by Willman.

D. Whether claim 26 is unpatentable under 35 U.S.C. § 103(a) over Willman in view of Rela.

E. Whether claims 27 and 42 are unpatentable under 35 U.S.C. § 103(a) over Willman in view of Sato.

F. Whether claim 28 is unpatentable under 35 U.S.C. § 103(a) over Willman in view of Hirayama.

G. Whether claims 29 and 43 are unpatentable under 35 U.S.C. § 103(a) over Willman in view of Arba.

H. Whether claims 63 and 64 are unpatentable under 35 U.S.C. § 103(a) over Hirayama in view of Sato.

IV. Argument (37 C.F.R. § 41.37(c)(1)(vii))

Appellants respectfully request that the Examiner's final rejection of claims 28-34 be reversed in view of the following remarks submitted in furtherance of Appellants' Appeal Brief filed on November 6, 2007. Each of the claims, as presented, is allowable.

A. Discussion of the Prior Art

Please see the discussion of the Prior Art in Appellants' Brief filed on November 6, 2007.

B. Claim 21-26 cannot be anticipated under 35 U.S.C. § 102(e) by Willman

Willman cannot anticipate the subject matter of independent claims 21-26 because Willman does not teach each and every element of these claims.

The deionization module of Willman is operative for removing dissolved ions from the concentrate stream of the reverse osmosis device. (Willman at paragraph [0007].) Willman provides a method for purifying a stream of feed water that includes directing the stream of feed water to an inlet of a reverse osmosis unit to produce an output stream of permeate water enriched in dissolved ions, removing dissolved ions from the output stream of concentrate water with a capacitive deionization module, and directing the output stream of concentrate water, after the dissolved ions are removed by the capacitive deionization unit to the inlet of the reverse osmosis unit. (Willman at paragraph [0009].)

Referring to Figure 1 of Willman, the CDI module 20 is incorporated in a recirculation path, generally indicated by reference numeral 40, that recycles the concentrate stream back to the feed water inlet 31 of the RO unit 18. Specifically, the inlet 38 of the CDI module 20 receives the concentrate stream, which would otherwise have been sent in a conventional water purification system to drain 22. The CDI module 20 operates to further remove residual dissolved ions in the concentrate stream to provide an output stream significantly depleted of dissolved ions. The ouput stream is directed by a fluid line 33 downstream of pressure regulator 14 and upstream of the feed water inlet 31 of the reverse osmosis unit 18. It follows that the output stream from the CDI module

20 is blended or combined with the filtrate stream from the pretreatment stage 12 and reenters the RO unit 18. (Willman at paragraph [0020].)

The CDI module 20 operates cyclically with a purification mode and a regeneration mode. In the purification mode, dissolved ions arriving in the concentrate stream from the RO unit 18 are held or trapped electrostatically at the surface of the charged electrodes 43. (Willman at paragraph [0022].) This leads to the dissolved ion-depleted output stream of the CDI module back to join the feed stream that has gone through the pretreatment stage. The CDI module 20 has a certain charging capacity for holding dissolved ions that, when reached, requires that the CDI module be regenerated to flush the trapped dissolved ions to drain 22. In the regeneration mode, the concentrate stream flowing through the CDI module 20 is directed to the drain 22 and the electrochemical cells of CDI module 20 are regenerated or rejuvenated by reversing the polarity of the applied electrical potential to electrodes 43 for a flushing cycle of sufficient duration to desorb substantially all of the trapped dissolved ions into the concentrate stream. (Willman at paragraph [0022].)

Specifically, when operating in the purification mode, the CDI module 20 typically removes about 90 percent of the ions in the concentrate stream. (Willman at paragraph [0024].) This would lead one to believe that the stream recirculating back to join the feed stream, and to be processed by the reverse osmosis unit is a purified stream, having few ions left in the stream after processing through the CDI module. In contrast, when operating in regeneration mode, as discussed above, the concentrate stream flushes the trapped dissolved ions into the concentrate stream, and disposes it to drain 22.

Therefore, in Willman, it is clear that only a stream almost completely devoid of ions makes its way through the recirculation loop, and to the reverse osmosis unit. Contrary to the Examiner's assertion, no waste stream is being recirculated to the reverse osmosis unit, and thus, Willman fails to disclose an auxiliary use fluidly connected to a waste stream of the electrochemical device.

One of ordinary skill in the art would clearly recognize that if the waste stream of the CDI was recirculated back through the system instead of being sent to drain 22, the unit operations in the recirculation loop would fail to operate properly, or be destroyed by the high concentration of dissolved ions that would be contained in this waste stream.

For example, in Figure 4 of Willman, if a stream containing high concentrations of dissolved ions were to flow through carbon filter 68 or reverse osmosis unit 18, these unit operations would be destroyed after a short time, and have to be replaced, at a costly expense.

Moreover, one of ordinary skill would recognize that the conductivity cells 63 and 65 of Willman are so placed within the recirculation loop 62 to monitor the dissolved ions content of this stream. As Willman acknowledges, the water conductivity is indicative of the residual concentration of dissolved ions. (Willman at parapgraph [0030].) For example, a reading out of range of normal operating parameters for the recirculation stream, would indicate to one of ordinary skill in the art that the surfaces of the charged electrodes of the CDI modules are saturated with ions, unable to absorb more ions from the stream, and thus requiring the CDI module to be regenerated to flush out the ions from the module.

To summarize, in regeneration mode, the stream exiting the CDI module can never be returned to the reverse osmosis unit via the recirculation loop. Accordingly, Willman does not disclose a water treatment system comprising an auxiliary use fluidly connected to a waste stream of an electrochemical device.

While the Examiner acknowledges that waste water passing out of the CDI devices is periodically routed to drain 22, he adds a creative theory that such water otherwise flows through the recycle loop back towards use and auxiliary use. (Examiner's Answer at page 11.) As noted above, Willman does not explicitly state that product dispenser 104 is fluidly connected to the waste stream (during regeneration mode) from electrochemical devices, as recited in claim 21. In Willman, only purified water is delivered to product dispenser 104. (See paragraphs [0034] and [0035].) It is contrary to the teaching of Willman to assume, as the Examiner has, that the waste stream from the electrochemical devices regeneration mode could flow through the devices to product dispenser 104. Willman discloses that the incorporation of the CDI module and recirculation path increases the purity of the product water because the CDI module operates to remove a significant fraction of the dissolved ions in the concentrate stream that remain after treatment by the reverse osmosis unit. (Willman at paragraph [0024].) If a significant fraction of the residual dissolved ions is removed by the CDI module, it

follows that during regeneration mode of the CDI module, the waste stream of the module contains the significant fraction of the residual dissolved ions, which is released to drain 22.

Therefore Willman cannot anticipate independent claim 21 because Willman fails to disclose each and every element in the manner recited therein.

Claims 22-26 depend from independent claim 21. These dependent claims also cannot be anticipated by Willman for at least the reason mentioned above.

The Examiner improperly infers that the pressure in all system components downstream of the reverse osmosis device, including the storage tank and intervening conduits, remains elevated. (See Examiner's Answer at page 13, 1st paragraph.) It does not necessarily follow that the water pressure downstream from the reverse osmosis unit remains at a pressure above atmospheric, as the Examiner asserts. Indeed, no reasoned explanation has been presented that such a condition must necessarily be present, as claimed in dependent claim 22.

Further, Willman at paragraph [0022] does not inherently require a controller that controls the current to the electrochemical device. Instead, Willman notes that the polarity of the applied electrical potential to the capacitive deionization module is reversed after providing 75 volumes of purified water, which can be effected manually and does not necessarily require a control system. Thus, no reasoned explanation has been set forth that makes clear that the control system is necessarily present or that one skilled in the art would recognize one as necessarily required because no evidence from the passage of Willman cited by the Examiner discloses a controller for regulating at least one operating parameter of the treatment system, as claimed in dependent claim 26

Therefore, because Willman fails to disclose each and every element in the manner respectively recited in dependent claims 22-26, these dependent claims cannot be anticipated by Willman.

C. Claims 40-41 and 44-45 cannot be anticipated under 35 U.S.C. § 102(e) by Willman

Willman cannot anticipate the subject matter of claims 40, 41, 44, and 45 because Willman does not teach each and every element of these claims.

Independent claim 40 claims a method for treating water comprising removing at least a portion of any undesirable species from water in an electrochemical device to produce treated water and discharge water. A portion of the treated water is transferred from the electrochemical device to the reservoir system, while a portion of the discharge water is be transferred to an auxiliary use.

As noted above, Willman does not disclose a method for treating water comprising transferring a portion of the discharge water to an auxiliary use. Willman only discloses discharging waste water periodically to drain 22 and fails to recognize the advantages associated with utilizing a portion of waste water from an electrochemical device to an auxiliary use. To underscore the importance of the lack of disclosure in Willman, this reference does not disclose any auxiliary use for waste water produced during regeneration mode. In fact, Willman refers to the waste water going to drain 22 as "wasted water," thus emphasizing that the water is not used subsequently to being passed through the drain. (Willman at paragraph [0022].) In contrast, product dispenser 104, which the Examiner asserts dispenses discharge water to an auxiliary use, is dispensing high-purity, laboratory-quality water from reverse osmosis unit 36. (Willman at paragraphs [0034] and [0035].) Thus, Willman cannot disclose a method of treating water comprising transferring a portion of discharge water from an electrochemical device to an auxiliary use.

As noted above, the Examiner misunderstands Willman to disclose that product dispenser 104 allows for an auxiliary use to be fluidly connected to a waste stream from an electrochemical device. This cannot be, because the waste stream from the electrochemical device exits at drain 22, and never enters recirculation stream 62, to flow through the reverse osmosis unit to product dispenser 104.

Therefore, Willman cannot anticipate independent claim 40 because the reference fails to disclose each and every recited element.

Dependent claims 41 and 44-45 depend from independent claim 40. These claims also cannot be anticipated by Willman for at least the same reasons discussed above. Further, Willman fails to disclose each of the elements recited in dependent claim 45. Specifically, Willman fails to disclose a method comprising adjusting an operating parameter of the electrochemical device. No disclosure of adjusting or controlling of the

parameter of applied electrical potential or polarity of the electrochemical device is apparent from paragraph [0022] of Willman, to which the Examiner refers. Instead, Willman notes that the polarity of the applied electrical potential to the capacitive deionization module is reversed after providing 75 volumes of purified water. No reasoned explanation has been set forth that makes clear that adjusting an operating parameter of the electrochemical device is necessarily performed or that one skilled in the art would recognize adjusting an operating parameter as necessarily required because no evidence from the passage of Willman cited by the Examiner discloses adjusting an operating parameter of the treatment system.

Therefore, dependent claims 41, 44, and 45 also cannot be anticipated by Willman.

D. Claims 51, 53, and 54 cannot be anticipated under 35 U.S.C. § 102(b) by Hirayama

Hirayama cannot anticipate the subject matter of claims 51, 53, and 54 because Hirayama fails to teach each and every element recited in these claims.

Hirayama does not disclose a water treatment system comprising a means for accumulating water from a water source at a pressure above atmospheric pressure. Specifically, Hirayama does not explicitly teach that tank 7 is pressurized. Indeed, no explanation has been presented for the notion that tank 7 must necessarily be pressurized or that one skilled in the art would recognize tank 7 to be necessarily pressurized.

The Examiner asserts that because Hirayama discloses that the water pressure at each inlet to electrochemical device 6 may be elevated (up to about 0.5 MPa), the pressure in tank 7 is presumably at above atmospheric pressure.[1]

Significantly, when read in context, the Examiner relies on a typographical error when referring to the cited passage. Hirayama explains that the pressure into the

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[1] Appellant assumes the Examiner relies on the passage at column 4, lines 4-9 of Hirayama, which states:

> The water pressure at each inlet of the diluting compartment, the concentrating compartment and the electrode compartment arranged in the electrodeionization apparatus is preferably less than 0.1 MPa and more preferably less than 0.5 MPa to prevent deterioration of the apparatus.

electrodeionization apparatus is preferably less than 0.1 MPa. One skilled in the art would recognize that Hirayama would more preferably utilize an inlet water pressure of less than "0.05 MPa" rather than "0.5 MPa" because lower pressures would "prevent deformation or deterioration of the apparatus." (Hirayama at col. 4, lines 4-9.) The preferred operating pressure of less than 0.1 MPa is particularly supported by Example 1, which explicitly states that the inlet pressure of apparatus 27 was adjusted to 0.05 MPa. Because anything less than 0.1 MPa is less than atmospheric pressure, Hirayama cannot disclose a water treatment system comprising a means for accumulating water from a water source at a pressure above atmospheric, as recited in independent claim 51.

Hirayama also fails to disclose a water treatment system comprising a household water distribution system. Instead, Hirayama discloses providing purified water for pharmaceutical or semiconductor manufacturing. The use of "city water" as a "feed water" for the source of water to be treated using the system disclosed in Hirayama does not necessarily indicate that this system comprises a household water distribution system. The type or source of feed water used in the treatment system does not imply or suggest the final use for the treated water. In fact, Hirayama emphasizes the production of deionized water. One of ordinary skill in the art would know not to use deionized water for household water distribution, because this deionized water would corrode the conventional household water distribution system.

Thus, independent claim 51 cannot be anticipated by Hirayama because this reference fails to disclose each and every element recited therein.

Dependent claims 53 and 54 depend from independent claim 51. For at least the same reasons mentioned above, these claims also cannot be anticipated by Hirayama as well as for the elements respectively recited therein.

E. Claims 62 and 65 cannot be anticipated under 35 U.S.C. § 102(b) by Hirayama

Hirayama also cannot anticipate the subject matter of claims 62 and 65 because Hirayama fails to teach each and every element recited in these claims.

As explained above, Hirayama does not disclose a water treatment system comprising a means for accumulating water from a water source at a pressure above

atmospheric pressure. As also explained above, Hirayama does not necessarily require that the water pressure exiting the electrochemical device outlets or entering the tanks is above atmospheric pressure much less that the water in the tanks are at a pressure above atmospheric pressure.

Further, Hirayama fails to disclose a method comprising adjusting at least one operating parameter of an electrochemical device. As used in the present application, operating parameters of the electrochemical device may include applied voltage and current. (Specification at page 15, lines 5-7.) Hirayama does not disclose adjusting the current or voltage of the electrodeionization device. The Examiner relies on the passage of Hirayama at col. 4, lines 66-67, which states, "the electrodeionization apparatus 27 was not flown with electric current during the second step." This passage cannot support the *prima facie* case of anticipation because there is no cogent explanation directed to adjusting an operating parameter of the electrodeionization device. At best, this passage discloses that the electrodeionization apparatus may be shut off (i.e., that no electric current was sent through the apparatus.).

The Examiner states that the phrase "operating parameter" is broad enough to read on control parameters during cleaning/sterilization cycles of an electrodeionization device. (Examiner's Answer at page 15.) The Examiner improperly interprets the phrase to include adjusting a parameter of the device even when the device is shut off or not in service. The Examiner cannot rely on a passage that discloses shutting off a device and extrapolate its meaning to show that this reference discloses adjusting an operating parameter of the electrodeionization device. Further, the Examiner states that, "Hirayama teaches to adjust both temperatures and pressures of the electrochemical device." (Reply Brief at page 15.) In fact, the temperatures and pressures disclosed by Hirayama relate to the water system, and not to the electrodeionization device.

Therefore, Hirayama cannot anticipate independent claim 62 because Hirayama fails to disclose each and every recited element.

Dependent claim 65 depends from independent claim 62. Hirayama also cannot anticipate this dependent claim for at least the reasons discussed above.

F. Claims 68 and 69 cannot be anticipated under 35 U.S.C. § 102(b) by Hirayama

Hirayama cannot anticipate the subject matter of independent claim 68 because Hirayama fails to teach each and every element recited therein.

As discussed above, Hirayama fails to disclose a system comprising a pressurized fluid reservoir. The Examiner again asserts that "the water pressure entering the electrochemical device inlets, just upstream of the tank 7 may be a quite elevated pressure of up to about 0.5 MPa." (Examiner's Answer at page 16). The Examiner is reading this statement from Hirayama out of context. Reading the passage of Hirayama in context, it is clear that one of ordinary skill in the art would recognize that Hirayama would more preferably utilize an inlet water pressure of less than 0.05 MPa (i.e., less than atmospheric pressure.) Thus, Hirayama does not disclose a system comprising a pressurized fluid reservoir.

Further, no cogent explanation has been set forth that supports the notion that the tanks disclosed by Hirayama must necessarily be pressurized. Thus, Hirayama does not and indeed, cannot disclose a pressurized fluid reservoir. Therefore, the *prima facie* case of anticipation is defective because the reference does not disclose each and every element recited in independent claim 68.

Dependent claim 69 depends from independent claim 68 and cannot be anticipated by Hirayama for at least the same reasons mentioned above.

G. Claim 70 cannot be anticipated under 35 U.S.C. § 102(b) by Hirayama

Independent claim 70 also cannot be anticipated by Hirayama because this reference also fails to teach each and every recited element.

As noted above, Hirayama critically fails to disclose a system comprising a pressurized fluid reservoir. When read in context and considered as a whole, including Example 1, a person skilled in the art would recognize that Hirayama does not teach a pressurizable reservoir system, as noted previously. Instead, it is clear that one of ordinary skill in the art would recognize that Hirayama teaches an inlet water pressure of less than 0.1 MPa, and more preferably less than 0.05 MPa (i.e., less than atmospheric pressure.) Further, no valid explanation has been set forth that explains why Hirayama's

tanks must necessarily be pressurized. Instead, Hirayama discloses that the pumps are fluidly connected downstream from the tanks. When considered as a whole, one skilled in the art would recognize that the reference discloses that the tanks are not pressurized because Hirayama utilizes pumps downstream of the tanks to facilitate delivery of the water to downstream unit operations. Indeed, without the use of the pumps, no fluid flow can be effected, which leads to the conclusion that the fluid in the tanks is not pressurized.

Thus, independent claim 70 cannot be anticipated by Hirayama because the reference cannot disclose each and every recited limitation.

H. Claims 62 and 65-67 cannot be anticipated under 35 U.S.C. § 102(e) by Willman

Independent claim 62 cannot be anticipated by Willman because Willman does not disclose each and every limitation recited in these claims.

The Examiner misreads Willman as disclosing a "tank 7 [that] may be at a quite elevated pressure of up to about 0.5 MPa." (Examiner's Answer at page 17.) Willman does not disclose a tank 7 or even any tank at an elevated pressure of up to about 0.5 MPa.[2]

Nonetheless, the Examiner still fails to explain how Willman necessarily discloses a method for treating water comprising accumulating water from a point of entry at a pressure that is above atmospheric pressure because no cogent discussion has been presented. Willman delivers permeate or purified water from a reverse osmosis unit into a storage tank. Willman does not state that the tank is pressurized.

Therefore, independent claim 62 cannot be anticipated by Willman because the reference does not disclose each and every limitation recited therein.

Dependent claims 65-67 depend from independent claim 62. These claims cannot be anticipated by Willman for at least the same reasons. Further, each of these claims

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[2] The Examiner appears to impermissibly rely on a passage in another reference, *i.e.*, Hirayama, for a rejection under 35 U.S.C. § 102(e). Thus, the Examiner's reply is defective.

cannot be anticipated by Willman because the reference does not disclose the additional advantageous features respectively recited therein.

Therefore, dependent claims 65-67 cannot be anticipated by Willman because the reference does not disclose each and every respectively recited element.

I. Claim 69 cannot be anticipated under 35 U.S.C. § 102(e) by Willman

In the Examiner's Answer dated December 20, 2007, the rejection of claim 69 under 35 U.S.C. § 102(e) by Willman has been withdrawn.

J. Claim 70 cannot be anticipated under 35 U.S.C. § 102(e) by Willman

Independent claim 70 cannot be anticipated by Willman because Willman fails to disclose each and every element recited therein.

Willman does not disclose a method of facilitating water treatment comprising providing a system comprising a pressurizable reservoir system that is fluidly connectable to a point of entry. Willman also does not disclose providing a system comprising an electrochemical device that is fluidly connected to the pressurizable reservoir system and to a water distribution system.

The Examiner asserts that Willman teaches that the reverse osmosis unit upstream of a storage tank is at elevated pressures. As previously noted, no discussion has been presented that explains why the storage tank of Willman must necessarily be pressurized. Willman, instead, discloses, with reference to FIG. 3, a recirculation path 52 including an ultraviolet light treatment unit 54 and a deionization module 56. Purified water product is pumped from storage tank 26 by a transfer pump 58 and returned to storage tank 26. (Willman at paragraph [0029].) Willman does not state that tank 26 is pressurizable.

Further, there is no reasoned explanation as to why tank 26 must necessarily be pressurizable. A statement that Willman discloses accumulating water from a point of use (source 24) in a storage tank 26 that is pressurized by way of booster pump 16 cannot support a conclusion that tank 26 must necessarily be pressurized or pressurizable because it is equally speculative to assume that tank 26 stores water at atmospheric pressure and flow of the purified water product can be effected by elevating tank 26, at atmospheric pressure, above dispenser 28.

Thus, because Willman does not disclose a method comprising providing a pressurizable reservoir and there has been no reasoned analysis to explain why Willman inherently discloses a method comprising providing a pressurizable reservoir, the reference cannot disclose each and every element recited in independent claim 70. Therefore, independent claim 70 cannot be anticipated by Willman.

K. Claim 26 is not unpatentable under 35 U.S.C. § 103(a) over Willman in view of Rela

Claim 26 depends from independent claim 21 and would not have been obvious over Willman in view of Rela. As noted above, Willman fails to disclose a treatment system comprising an auxiliary use fluidly connected to a waste stream from an electrochemical device, as recited in independent claim 21. As described in detail above, during purification mode, the outlet stream of the CDI module is a purified stream, and recirculates back to join the feed stream, to be processed by the reverse osmosis unit. This stream contains few ions after being processed through the CDI module. In contrast, when operating in regeneration mode, as discussed above, the concentrate stream flushes the trapped dissolved ions into the concentrate stream, and disposes it to drain 22. Thus, it is clear that Willman teaches providing purified water to the alleged auxiliary use (product dispenser) 104, but does not disclose an auxiliary use fluidly connected to a waste stream from an electrochemical device. It is also evident that one or ordinary skill in the art would not recirculate the regeneration waste stream of the regeneration mode through the reverse osmosis unit or other unit operations due to the detrimental effects a stream containing high concentrations of dissolved ions would have on this equipment.

Rela also fails to disclose an auxiliary use fluidly connected to a waste stream from an electrochemical device, and thus fails to cure the deficiencies of Willman. The rejection is thus improper because no *prima facie* case of obviousness has been set forth since the references fail to teach or suggest all the elements recited in dependent claim 26. 35 U.S.C. § 103(a), MPEP §§ 2141, 2142. Further, as noted, the Examiner's Answer is defective because no explanation has been presented for the allegedly inherent condition.

Thus, dependent claim 26 would not have been obvious over Willman in view of Rela because any alleged combination of the references would fail to teach each and every element recited therein.

L. Claims 27 and 42 are not unpatentable under 35 U.S.C. § 103(a) over Willman in view of Sato

Dependent claims 27 and 42 would not have been obvious over Willman in view of Sato.

Appellants maintain that this rejection is improper because no teaching, suggestion, or motivation has been set forth to utilize the systems or methods of Willman because this reference does not disclose a system comprising an auxiliary use fluidly connected to a waste stream from the electrochemical device as recited in claim 27, or a method for treating water comprising transferring a portion of discharge water, waste water from the electrochemical device, to an auxiliary use, as recited in claim 42. As described in detail above, one of ordinary skill in the art would recognize that Willman discloses only sending a purified stream recirculating back to join the feed stream, and to be processed by the reverse osmosis unit. This purified stream containing little or no dissolved ions after processing through the CDI module, is directed through the reverse osmosis unit, which may then be dispensed through product dispenser 104. In contrast, when operating in regeneration mode, as discussed above, the concentrate stream flushes the trapped dissolved ions into the concentrate stream, and disposes the stream containing highly concentrated dissolved solids, not through the recirculation loop, but to drain 22.

Further, Willman does not disclose a treatment system wherein the point of use comprises an appliance, as recited in claim 27, or a method wherein distributing a portion of the treated water comprises distributing water to a household, as recited in claim 42. Sato fails to compensate for the deficiencies of Willman. Again, any combination of these references would fail to teach each and every element recited in dependent claims 27 and 42.

The Examiner's assertion that faucets are appliances is misdirected. Faucets are fixtures for dispensing water, while appliances are pieces of equipment, such as washing

machines or dishwashers that require water for use. (See specification at page 12, lines 23-25.)

Further, no teaching or suggestion has been properly set forth to modify the disclosure of Willman in the manner claimed to produce treated water for household use, *e.g.*, in an irrigation application. As noted, Willman discloses a water purification system and method for producing high-purity, laboratory-quality product water. (See Willman at Abstract and at paragraph [0006].) Sato similarly seeks to produce ultra pure water. (See, for example, Sato at Column 1, lines 5 to 8 and at column 2, lines 17 to 21.)

Sato emphasizes that the "object of the present invention [is] to provide an electrodeionization apparatus which removes silica and boron at extremely high ratio, a method of operating the same, and a system employing the electrodeionization apparatus for producing ultra pure water." (Sato at column 2, lines 16-21.) Sato repeatedly emphasizes that the water produced by the disclosed system provides ultra pure water. The prosecution history of Willman further provides compelling evidence that an ordinarily skilled artisan would realize the differences between ultra-pure water and water for purposes which do not require high purity. In view of the explicitly stated objects of the teachings of Willman and Sato, *i.e.*, to provide ultra-pure water, no *prima facie* case of obviousness can be made because one skilled in the art would not have modified the disclosure of Willman, which is directed to producing high purity water, and modify it to produce water for household use.

Therefore, claims 27 and 42 would not have been obvious over Willman in view of Sato because the combined disclosures cannot teach, suggest, nor would have resulted in a system comprising an auxiliary use fluidly connected to a waste stream from an electrochemical device or an appliance, or in a method comprising transferring a portion of the discharge water to an auxiliary use or distributing water to a household.

M. Claim 28 is not unpatentable under 35 U.S.C. § 103(a) over Willman in view of Hirayama

Dependent claim 28 would not have been obvious over Willman in view of Hirayama. Dependent claim 28 claims a treatment system as in independent claim 21 and further comprising a heat exchanger thermally connected to the reservoir system. As

noted above, Willman fails to disclose each and every element of independent claim 21, from which claim 28 depends. Hirayama also does not disclose a system comprising an auxiliary use fluidly connected to a waste stream from an electrochemical device and thus fails to cure the deficiencies of Willman. Therefore, even if the references could have been combined, any resultant combination would fail to disclose each and every element of dependent claim 28.

The Examiner incorrectly reads Hirayama as disclosing circulating purified water in a loop employing reverse osmosis filters and an electrodeionization device. At FIGS. 1a, 1b, 2a and 2b, Hirayama instead discloses a loop with a reverse osmosis device 5 and an electrodeionization device 6.

The Examiner's reference to column 3, lines 60-64 of Hirayama to demonstrate that temperatures may be maintained at elevated levels during operation of the electrodeionization unit, not merely during sterilization is incorrect. Hirayama at column 3, lines 60-64 states:

> After disinfecting the electrodeionization apparatus by the hot water, then the temperature of the hot water fed to the electrodeionization is fallen gradually at a rate of 0.1-10°C/min down to 40° or lower, preferably 35°C or lover, most preferably to the ambient temperature.

The Examiner's reliance on this passage of Hirayama fails to explain how a heat exchanger is thermally connected to a reservoir system in the system disclosed by Willman. Further, dependent claim 28 would not have been obvious over Willman in view of Hirayama because any alleged combination of the references would not have resulted in the invention as claimed and because any motivation to combine the references would run contrary to the objects of the references.

N. Claims 29 and 43 are not unpatentable under 35 U.S.C. § 103(a) over Willman in view of Arba

Dependent claims 29 and 43 would not have been obvious over Willman in view of Arba.

As explained above, Willman fails to disclose a treatment system comprising an auxiliary use fluidly connected to a waste stream from an electrochemical device, as recited in claim 29, or a method for treating water comprising transferring a portion of the

discharge water to an auxiliary use, as recited in claim 43. Further, both Willman and Arba do not disclose a system wherein the auxiliary use comprises an irrigation system, as recited in claim 29, or a method of treating water wherein transferring the discharge water to the auxiliary use comprises transferring at least a portion of the discharge water to an irrigation system. Arba also fails to disclose these recited elements.

As noted, Arba utilizes sterilized water for irrigation of biological tissue. Because sterilized high-purity water is disclosed by Arba, this reference does not and cannot disclose a system that delivers a waste stream for the purposes of irrigation. Indeed, in the present invention, a waste stream, rather than going to drain 26, may be used to provide, for example, irrigating water to any residential, commercial or industrial use, such as for irrigating, for recycling, or for recovery of collected or concentrated salts. (Specification at page 16, lines 16-20). There is no teaching or suggestion in the references to utilize water as an auxiliary use, which as noted above is typically discharge water as a waste stream from the electrochemical device. Thus, the *prima facie* case of obviousness is improper.

Therefore, claims 29 and 43 would not have been obvious over Willman in view of Arba because the rejection is improper for failing to properly set forth a *prima facie* case of obviousness since the alleged combination would fail to teach each and every element respectively recited in the claims.

O. Claims 63 and 64 are not unpatentable under 35 U.S.C. § 103(a) over Hirayama in view of Sato

Dependent claims 63 and 64 would not have been obvious over Hirayama in view of Sato. These dependent claims depend from independent claim 62. As noted however, independent claim 62 cannot be anticipated by Hirayama because, as discussed above in detail, the reference fails to teach a method comprising accumulating water from a point of entry at a pressure that is above atmospheric pressure and adjusting at least one operating parameter of the electrochemical device. Sato fails to cure the deficiencies of Hirayama.

Further, Sato and Hirayama disclose systems and techniques relevant to producing ultra pure water, and not water for a household appliance, as recited in claims 63 and 64.

Although Sato mentions that deionized water (but not ultra pure water) can be used for household purposes, Sato emphasizes that the "object of the present invention [is] to provide an electrodeionization apparatus which removes silica and boron at extremely high ratio, a method of operating the same, and a system employing the electrodeionization apparatus for producing ultra pure water." (Sato at column 2, lines 16-21.) An ordinarily skilled artisan, however, would have recognized that there are notable differences between ultra pure water and "deionized water for household" use. Significantly, Sato repeatedly emphasizes that the water produced by the disclosed system provides ultra pure water, without any teaching or suggestion that the produced ultra pure water can be suitable for household use. Significantly, a person of ordinary skill in the art would not have utilized ultra pure water to provide for household needs because ultra pure water is extremely corrosive and, if introduced in household structures, would corrode the conventional household water distribution system. No *prima facie* case of obviousness can be made because one skilled in the art would not have modified the disclosure of Hirayama, which is directed to producing high purity water, and modify it to produce water for household use because the water quality requirements of each differ significantly.

Again, the Examiner asserts that Hirayama discloses "production/purifying of city water." (Examiner's Answer at page 20, 2nd paragraph.) The Examiner's argument is misplaced. As noted above, Hirayama discloses the source of "feed water" as city water, which is purified using the treatment system of Hirayama to produce ultrapure water. Hirayama does not disclose use of the treated water for household uses.

Thus, even if the references could have been combined, the references would be relevant to providing ultra pure for pharmaceutical and semiconductor fabrication operations, but not deionized water for household use or for household appliances as recited in claims 63 and 64.

Additionally, even if the teachings of the references could have been combined, any alleged combination would likewise fail to recite each and every element dependent

claims 63 and 64. Therefore, claims 63 and 64 would not have been obvious over Hirayama in view of Sato because the rejection is improper for failing to set forth a *prima facie* case of obviousness.

P. Conclusion

For the reasons provided above, each of the rejections is improper and should be reversed. Appellants respectfully request reversal of the rejections and issuance of a Notice of Allowance.

V. Claims Appendix: Claims as Appealed (37 C.F.R. § 41.37(c)(1)(viii))

Listing of Claims

1-20. (Canceled)

21. (Previously Presented) A treatment system comprising:
a reservoir system fluidly connected to a point of entry;
an electrochemical device fluidly connected to the reservoir system;
a point of use fluidly connected to the reservoir system; and
an auxiliary use fluidly connected to a waste stream from the electrochemical device.

22. (Original) The treatment system of claim 21 wherein the reservoir system is pressurized.

23. (Original) The treatment system of claim 21 further comprising a pretreatment system fluidly connected upstream of the electrochemical device.

24. (Previously presented) The treatment system of claim 23 wherein the pretreatment system comprises a reverse osmosis device.

25. (Original) The treatment system of claim 23 wherein the pretreatment system comprises a carbon filter.

26. (Original) The treatment system of claim 21 further comprising a controller for regulating at least one operating parameter of the treatment system.

27. (Original) The treatment system of claim 21 wherein the point of use comprises an appliance.

28. (Original) The treatment system of claim 21 further comprising a heat exchanger thermally connected to the reservoir system.

29. (Original) The treatment system of claim 21 wherein the auxiliary use comprises an irrigation system.

30-39. (Canceled)

40. (Previously Presented) A method for treating water comprising:

introducing water from a point of entry to a reservoir system;

removing at least a portion of any undesirable species from the water in the reservoir system in an electrochemical device to produce treated water and discharge water;

transferring at least a portion of the treated water from the electrochemical device to the reservoir system;

transferring a portion of the discharge water to an auxiliary use; and

distributing a portion of the treated water from the reservoir system to a point of use.

41. (Original) The method of claim 40 wherein the reservoir system is pressurized.

42. (Original) The method of claim 40 wherein distributing a portion of the treated water comprises distributing water to a household.

43. (Original) The method of claim 40 wherein transferring the discharge water to the auxiliary use comprises transferring at least a portion of the discharge water to an irrigation system.

44. (Original) The method of claim 40 further comprising pretreating the water before removing the at least a portion of the any undesirable species from the water.

45. (Original) The method of claim 40 further comprising adjusting an operating parameter of the electrochemical device.

46-50. (Canceled)

51. (Previously presented) A water treatment system comprising:

means for accumulating water from a water source at a pressure above atmospheric pressure;

an electrochemical device fluidly connected to the means for accumulating water;

means for heating the water; and

a household water distribution system.

52. (Canceled)

53. (Original) The system of claim 51 further comprising a pretreatment system fluidly connected upstream of the means for accumulating water.

54. (Previously presented) The system of claim 51 further comprising a means for adjusting an operating parameter of at least one of the electrochemical device, the means for accumulating water and the household water-distribution system.

55-61. (Canceled)

62. (Previously Presented) A method for treating water comprising:

accumulating water from a point of entry at a pressure that is above atmospheric pressure;

providing an electrochemical device;

transferring at least a portion of the accumulated water to the electrochemical device;

removing at least a portion of any undesirable species from the water in the electrochemical device to produce a treated water; and

adjusting at least one operating parameter of the electrochemical device.

63. (Original) The method of claim 62 further comprising supplying at least a portion of the treated water to a household appliance.

64. (Original) The method of claim 63 further comprising heating at least a portion of the treated water prior to supplying the water to a household appliance.

65. (Original) The method of claim 62 further comprising calculating a desired property of the treated water.

66. (Original) The method of claim 62 further comprising reversing a polarity of an electric field applied across the electrochemical device.

67. (Original) The method of claim 62 further comprising adjusting a time delay between reversing cycles.

68. (Previously presented) A system comprising:

a pressurized fluid reservoir in thermal communication with a heat exchanger; and

a fluid treatment device fluidly connected to the pressurized fluid reservoir, wherein the fluid treatment device comprises a device selected from the group consisting of an electrochemical device and a reverse osmosis device.

69. (Previously presented) The system of claim 68 wherein the fluid treatment device comprises an electrochemical device.

70. (Original) A method for facilitating water treatment comprising:

providing a system comprising a pressurizable reservoir system that is fluidly connectable to a point of entry and an electrochemical device fluidly connected to the pressurizable reservoir system and fluidly connectable to a water distribution system.

VII. Conclusion

For the reasons provided above, the rejections are improper and should be reversed. Appellants respectfully request reversal of the rejections and issuance of a Notice of Allowance.

If there is any additional fee occasioned by this filing, including an extension fee that is not covered by an accompanying payment, please charge any deficiency to Deposit Account No. 50/2762, Ref. No. 10168-707619.

Respectfully submitted,
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